HOME OFFICE

# CIVIL DEFENCE

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# General Instructor's Notes

January 1953

LONDON: HER MAJESTY'S STATIONERY OFFICE

1953

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## Amendment No. 1

(These amendments are included in the 1953 reprint of General Instructor's Notes)

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# A G 5 REFUGE ROOM

**Notes for Instructor**

1. This lecture and practice on the selection and protection of a Refuge Room is given to the General Instructor as a guide should he at any time be called upon to give this instruction.

2. Instructor will find following home-made visual aids useful for lectures.

(*a*) Pictorial diagram of interior of typical refuge room.

(*b*) Model window and frame, with net curtains pasted on.

(*c*) Model window and frame, with a small mesh wire netting (mesh not larger than half an inch) fastened to frame.

(*d*) Model window and frame, with lightweight wooden shutter (a type giving a " push fit " into window frame) with stout rubber anchorages top and bottom.

3. For the practice which follows the lecture, the use of a house, preferably basement type, is required. The Instructor should make a preliminary survey so that he is familiar with any peculiar features.

**Object of Lecture and Practice**

4. To study the principles governing the selection and protection of a refuge room in an ordinary house, and to practise the selection of such a room.

**Selection and Protection of Room**

5. Refuge room next best thing to approved type of shelter. Cupboard under stairs very popular 1939/45. Use of refuge room for sick people, babies and small children during night, better than going out in bad weather.

6. Main Points for Consideration: Intended to give shelter from blast and splinters, not direct hit. Must have separate entrance and exit. All round thickness of walls of 13½ inches of brickwork or its equivalent. Basement room very good, ground floor next.

7. Overhead structure and fittings to be taken into consideration. Debris load on ceiling may indicate need for shoring. Large water tanks directly overhead may constitute added risk.

8. Door and window openings should be protected to bring up to required wall thickness. Windows should have glass protected by one of the following methods:—

(*a*) Net curtain pasted on glass and frame.

(*b*) Small mesh wire netting (mesh not larger than half a inch) fastened to frame.

(*c*) Lightweight wooden shutter (a " push fit " into the window frame) anchored by stout rubber top and bottom.

9. Basement and ground floor rooms can be made safer if ceiling joists are supported by an adequately braced system of posts.

**Emergency Exits**

10. All refuge rooms must have an emergency exit. Basement may have coal chute which may be widened or hole may be made into adjoining house and filled in with loose bricks.

**Protection Afforded**

11. Well selected room in ordinary dwelling house, protected as above, will prevent destruction by blast and penetration by splinters from 500 lb. medium case bomb exploding 50 feet away.

**Equipment for Refuge Room**

12. Occupation of room may be for long period. Articles likely to be required listed at Appendix A.

**Visit House and Select Refuge Room**

13. Some notes on procedure given at Appendix B.

**Concluding Summary**

14. Object has been to study principles of selection and protection of refuge room. An approved type shelter is preferable, particularly in areas where scale of attack may be heavy.

R561

# SG5

*Supplementary General Training*

## SG5 ADDITIONAL DATA ON BLAST

**Introductory Note**

1. Reference Civil Defence Manual of Basic Training, Volume II, Pamphlet No. 6, Atomic Warfare.

2. This lecture on additional data on blast is given to the General Instructor as background knowledge only.

**Object of Lecture**

3. To give additional information on blast from H.E. and Atomic Bombs, and its probable effect upon structures.

**Blast from typical H.E. Bomb**

4. At a distance at which fairly severe structural damage would be caused the blast pressure from a medium-sized H.E. bomb rises instantly to about 15 lbs. per square inch (i.e. much more than the STATIC load which any normal structure could withstand).

**Comparison between Sudden Blow and Steadily Applied Force**

5. Above pressure only lasts very short time (1/100 of a second) and is therefore more in nature of sudden blow. Damage caused by such blow depends not only on pressure but on time for which pressure is applied. Product of these two known as IMPULSE, and measures damaging ability of normal H.E. bomb. Point can be demonstrated on ordinary door. Door can be pushed wide open by very small force applied slowly by finger. If struck a hard sharp blow with fist door will move very little. If door hit hard enough (e.g. by blast) it may be torn off hinges without opening appreciably further.

**Suction Phase**

6. Impulse phase described above is followed at once by opposite phase negative pressure, or SUCTION phase. This is about one-third of pressure in impulse phase but lasts about three times as long. Destructive power of both phases are thus approximately equal. Since suction phase appears last there is tendency for its effects to predominate particularly towards limit of damage, e.g. wall of building may be badly strained or cracked by pressure phase and may collapse outwards in suction phase.

**Effect of increasing size of H.E. Bomb**

7. This increases duration of blast, and hence increases impulse. Therefore at distance where pressure is considerably less than at corresponding distance from smaller bomb equal damage will be caused.

**Atomic Bomb Blast** 20 KILOTONS YIELD

8. If same consideration applied to Atomic Bomb it would be expected to demolish 9-inch walls at over 10 miles. At this distance, however, atomic blast peak pressure is only 1/10 lb. per square inch and well within static strength of wall however long pressure applied.

9. Impulse factor, therefore, breaks down in case of atomic bomb. Here blast pressure rather than impulse tends to govern damage. If former exceeds static strength of structure failure must be expected. If less, no failure however long the duration of blast. Atomic blast more analagous to wind than to sudden blow of normal H.E. blast. Hence, if building does not fail under pressure phase, it is most unlikely to fail under much lower pressure of suction phase. This was very noticeable in Japan.

(*b*) General Standard of Protection: Anderson Shelter, Morrison Shelter, and Standard Surface Shelter—or examples of shelter wall construction—which can be expected to provide very good protection against effect of 500 lb. medium case bomb exploding 15 feet away from shelter wall.

(*c*) Grade A Standard of Protection: Anderson Shelter with extra earth covering and baffle wall to entrance, and both types of shelter wall construction, which are required in areas liable to atomic attack.

**Morrison Shelter**

3. Holds two adults and one child (or two very small children). Suitable for the two-storey house, and will stand up to collapse of whole of such house. Must be placed on solid floor without any room or cellar below it. Steel mesh sides to protect the shelterers from flying debris should the protecting walls be blown in.

**Protection against Blast and Splinters**

4. Trench Shelter: 1939/45 war type. Roofed. Concrete lined or with alternative revetment of timber, corrugated iron, filled sandbags, wire mesh or expanded metal. Experience during the war proved that in order to prevent the collapse by earth shock, the roof, floor and all walls must be adequately tied together as a continuous structural unit. (Note that a top cover of 3 feet of earth, or its equivalent, will convert shelter to Grade A standard.)

5. Brick Surface Shelter: Early 1939/45 war type with walls of 13½-inch unreinforced brickwork.

6. Refuge Room: In building with walls of 9-inch thick unreinforced brickwork, to which has been added an outside skin of 4½ inches of unreinforced brickwork or 5 inches of unreinforced concrete up to a minimum height of 6 feet above floor level. An alternative skin is 10 inches of earth behind shuttering. Windows, and any outside door bricked or concreted up to same height and equivalent thickness. Windows, where gap has been left at top to admit daylight, provided with anti-shatter protection. Ceiling joists, supported by adequately braced posts to give added strength against possible debris load.

**General Standard of Protection**

7. Anderson Shelter: Baffle wall required unless entrance screened (within 15 feet) by building or existing wall. Sunk about 3 feet into ground and covered with earth to minimum depth of 18 inches over the arch of the shelter and at the back. Standard type of 6 feet 6 inches in length designed to shelter six persons. Capable of being lengthened to accommodate 8, 10 or 12 persons, or shortened to accommodate four. If the Anderson is reduced below 6 feet 6 inches in length, bunks cannot be fitted.

8. Standard Surface Shelter: Walls of 12-inch reinforced concrete or 13½ inches reinforced brickwork (Quetta Bond) and 6-inch reinforced concrete roof tied to walls.

**Grade A Standard of Protection**

9. Indication of required thicknesses of reinforced concrete walls (24 inches) and reinforced brickwork (27 inches) for shelters in areas liable to atomic attack. The roof should be of reinforced concrete not less than 2 feet thick and the floor not less than 5 inches thick.

10. The protection given by the Anderson Shelter can be brought up to Grade A by increasing the earth cover to a thickness of 3 feet provided that the entrance is sufficiently screened against radiation. The conversion of Anderson Shelters to Grade A in this way clearly, however, presents practical difficulties and it is unlikely that it will be possible to bring most Andersons up to full Grade A standard. But in or near areas which seem likely to be selected as targets for atomic attack any additional earth cover that can be provided will be worthwhile. The difficulty of baffling the entrance against gamma radiation may to some extent be overcome by siting a shelter so that the entrance faces away from the most likely ground zero. It must, however, be emphasised that this would not provide full Grade A protection.

**Concluding Summary**

11. Object has been to show examples of shelters and/or thicknesses of materials and types of wall construction required for the various standards of protection laid down by the Home Office.

# BG8

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*Basic General Training*

## BG8 OTHER AIR WEAPONS AND UNEXPLODED BOMBS

### Notes for Instructor

1. Reference: Civil Defence Manual of Basic Training, Volume II, Pamphlet No. 5, Basic Methods of Protection against High Explosive Missiles, Section 5.

2. Instructor will find home-made diagrams (or photographs) of following are useful visual aids:—

   (*a*) Parachute mine.

   (*b*) Flying bomb.

   (*c*) Long range rocket.

   (*d*) Typical indications of unexploded missiles.

3. Technical details (between brackets) in paras. 5 and 6 below are included for their interest value only.

### Object of Lecture

4. To teach some facts about parachute mine, flying bomb and long range rocket; and to give some knowledge of signs indicating presence of unexploded bombs and of precautions to be observed.

### Parachute Mine

5. Ordinary naval parachute mine often dropped on land targets by Germans during 1939/45 war. Some were fused to burst some seconds after impact; others to burst on approach of any steel or iron object; others, again, to burst when mine was disturbed by moving. Case of light metal alloy and heavy charge of HE. Caused much blast damage.

### Flying Bomb

6. As used in latter part of 1939/45 war, was jet propelled crewless monoplane with automatic pilot and steering. Timed to dive to ground and explode after certain distance run. (Warhead one ton of HE. Speed about 400 m.p.h. maximum. Range about 150 miles.) Caused much material damage in campaign against London and district.

### Long Range Rocket

7. As used in latter part of 1939/45 war, was propelled by mixture of liquid oxygen and alcohol. (Length 46 feet. Total weight with eight and a half tons of fuel was 12½ tons. Maximum speed 3,500 m.p.h. Maximum range 200 to 230 miles. Reached height of 50 to 60 miles on journey to England from Holland. Launched from transportable platform. Warhead about one ton.)

8. Area of material damage caused by rocket similar to that of flying bomb, although area of heavy damage slightly greater and area of light damage considerably less. Caused more casualties than flying bomb on account of surprise effect. No time for warning signals.

### Unexploded Bombs

9. Unexploded missiles have considerable tactical value. To safeguard public, affected area is evacuated with consequent loss of industrial production. Ten per cent. of bombs on United Kingdom 1939/45 were UX. Quick detection essential. Reason for UX Missiles may be defective fuses or delayed action fuses. All UX missiles must be treated as delayed action, as no means of differentiating.

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18. Testing Contamination Meter: With contamination meter, if Type A source placed 13 inches from Geiger counter, about 4 milliroentgens per hour should be recorded.

Type A = radium in 0.5mm platinum casing

**Type B Radioactive Source** (button type)

19. Small source of radiocobalt for demonstrations of radioactive contamination using contamination meter. Intended to be hidden in personal clothing. Will produce doserate about 0·16 milliroentgens per hour at one yard.

**Type C Radioactive Source**

20. Small source of radiocobalt for classroom use. One source placed few inches from individual dosimeter of training type will produce half-scale deflection in one hour. With training type doserate meter, full-scale deflection produced at distance of between two and three yards. Will produce doserate of about 1·6 milliroentgens per hour at one yard.

**Type D. Radioactive Source**

21. Medium source of radiocobalt intended primarily for outdoor demonstrations and exercises with training type doserate meter. Four such sources, suitably arranged at ten yard intervals, adequate for outdoor demonstration or exercise with doserate meter over walk of about 70 yards (see Appendix A). Will produce doserate of 7·8 milliroentgens per hour at one yard.

**Hazards**

22. Above sources give off gamma rays continuously. These rays even more penetrating than X-rays but (as with X-rays) effect reduced by distance and shielding. Gamma rays harmful to living matter. Cannot be detected by ordinary senses and appropriate meters must be used. They must be allowed to enter meters and must, therefore, enter persons carrying meters. Rays are injurious if they enter human body in excessive quantities, but small daily doses can be tolerated by normal body without harm. For scientific workers who are in daily contact with radioactivity this maximum daily tolerance dose is 100 milliroentgens (500 milliroentgens per week) and this is used for purpose of civil defence training. Much larger occasional doses would be accepted in war, however, especially as such doses would not be repeated daily but only when urgent needs dictated.

23. In ordinary training, size of sources such that with suitable precautions doses received will be harmless whilst still giving readable deflections on training meters; but essential to limit doses of radiation by:—

(*a*) Good discipline.

(*b*) Simple, unambiguous orders which are easy to remember.

(*c*) Reliable, individual dosimeters which are well maintained and serviced and which are checked frequently against standard sources.

24. Since sources used for training are all in sealed capsules there is no need for protection against radioactive dust or spray. No special protective clothing need, therefore, be worn.

25. Essential for protection of Instructors, classes under training and other persons concerned, that rules at Appendix B be strictly complied with. In particular, following measures essential wherever radioactive sources are used:—

(*a*) An individual dosimeter should be carried by every person who will handle or use A, C or D sources or for any person who could possibly receive more than 100 milliroentgens during course of one day.

(*b*) All individual dosimeter readings should be recorded at end of period of exposure.

(*c*) Radioactive sources should be locked in Radioactive Sources Store when not in use.

26. Certain photographic materials (e.g. film negatives) are likely to be affected by small doses of radiation and should, therefore, not be left or carried where they are likely to be damaged from this cause. Classes should be warned of this beforehand to enable them to leave in safe place any such articles they may be carrying. Containers in which sources are kept when not in use do NOT provide complete protection for film negatives.

# MANUAL OF BASIC TRAINING

## VOLUME I

*Pamphlets*



## VOLUME II



*Binders for these pamphlets are available, price* 1s. 6d. (1s. 8d.)

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